1998

Chief Inspector Of Mines

Annual Report

BRITISH COLUMBIA

Ministry of Energy and Mines
Energy and Minerals Division

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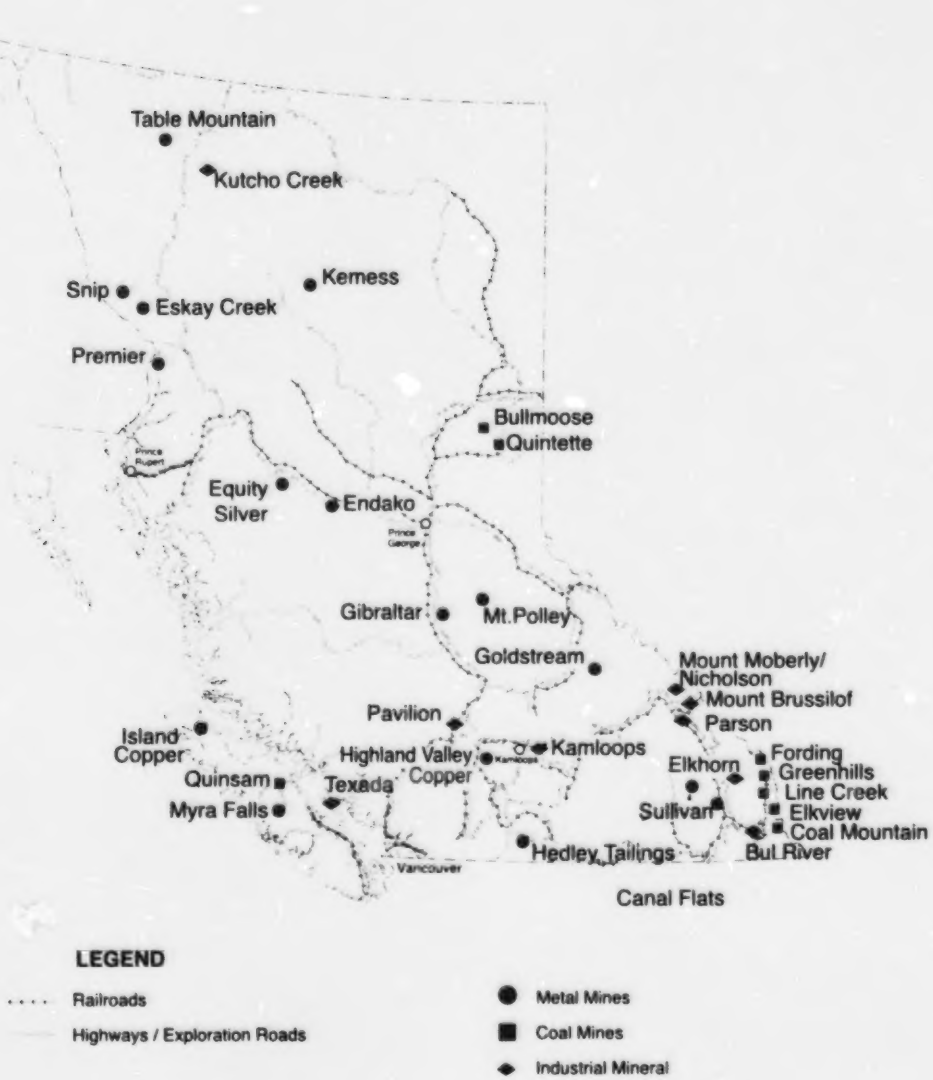

Mines Operating During 1998

Foreword

The Chief Inspector of Mines is appointed by the Minister of Energy and Mines to administer the *Mines Act* and the Health, Safety and Reclamation Code for Mines in B.C. In 1998 the Chief Inspector of Mines, F.W. (Fred) Hermann, was also the director of the Mines Branch.

The Mines Branch functions through a central office in Victoria and five regional offices: Cranbrook, Kamloops, Nanaimo, Prince George and Smithers, plus a satellite office located in Fernie. Personnel in each of the regional offices are generally comprised of a regional manager supported by diverse technical and administrative staff. The regional manager in the Cranbrook office is responsible for the satellite office in Fernie.

Contacts

Information about the ministry and copies of ministry publications are available through the following options:

Ministry Web site:
www.gov.bc.ca/em

Queen's Printer Publications Index Web site:
www.publications.gov.bc.ca

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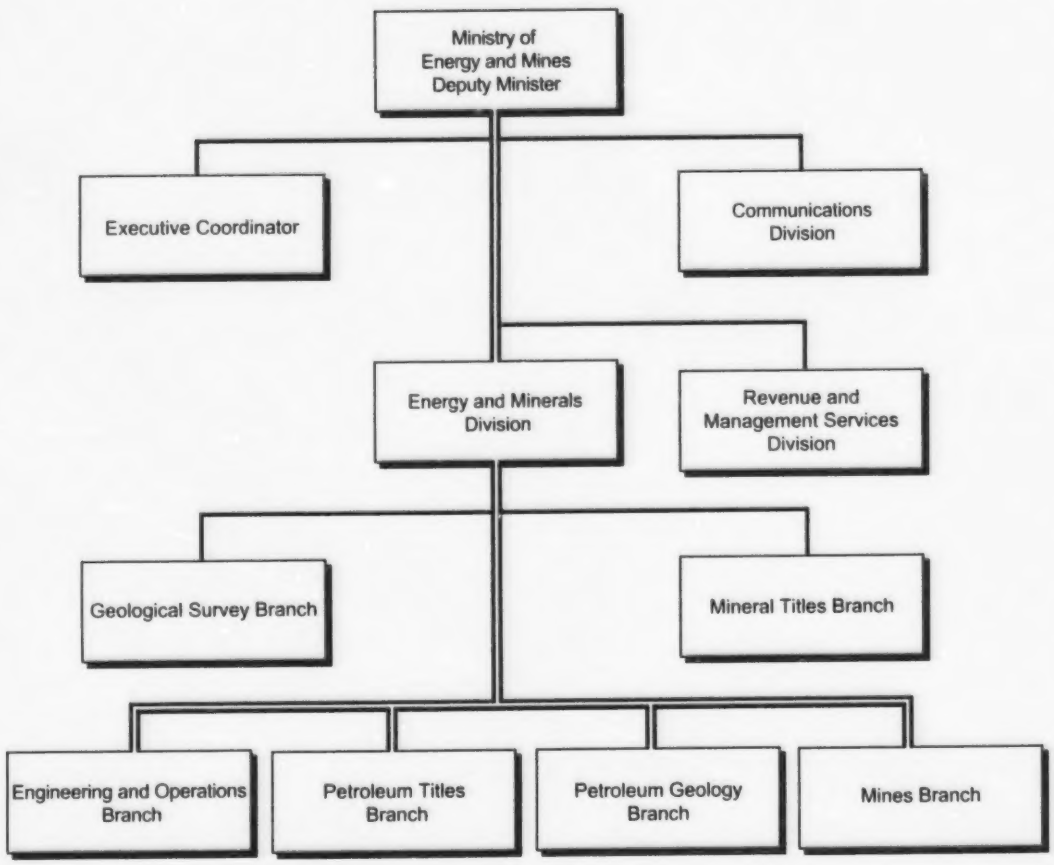
Further information on the activities of the various mining companies can be found in the Canadian Mines Handbook published each year by Northern Miner Press Limited (604) 688-9908 or from each mining operation. In addition, you can contact the Mining Association of B.C. (604) 681-4321 and the Coal Association of Canada (403) 262-1544. Each issue annual reports on the status of those sectors.

Ministry Organization Chart



1.1 Mine Health and Safety Function

Mandate/Activities

The Mines Branch function derives its mandate from the *Mines Act* and its accompanying Health, Safety and Reclamation Code for Mines in B.C. (the Code).

The Code is reviewed on a regular basis by the code review committee comprising representatives from labour, industry and government, and chaired by the Chief Inspector, to ensure it remains current with new technology, mining practices and health and safety concerns. The code review committee undertook a major revision of the Code in 1995 and 1996. The current edition of the Code was released in April 1997.

The key mandate of the branch with respect to health and safety is to ensure worker health and safety, and public safety. In order to accomplish this the branch functions include:

- the review of health and safety related aspects of mining and exploration proposals;
- mine inspections and the close monitoring of mining activity for conformance with the *Mines Act* and Code and the approval of mine plans with regard to health and safety concerns;
- the collection of data and maintenance of records with respect to accidents, dangerous occurrences, inspection frequencies and audiometric (hearing test) data; and,
- participation in research projects.

1.2 Mining Administration Function – non-health and safety component:

Mandate/Activities

The Mines Branch administers and regulates the full mining cycle including exploration, development production, reclamation and closure for metal, placer, industrial mineral and coal mines, and gravel pits and quarries. This mandate includes the review of applications and issuance of permits under section 10 of the *Mines Act* for all mining activities including major mining projects subject to the *Environmental Assessment Act*, establishment of geotechnical and reclamation standards and security levels, participation in regional and subregional planning, and in reviews of draft legislation and policies being developed by other agencies. Branch staff also provides guidance and assistance to companies and individuals exploring for minerals, and monitor exploration and mining activities in order to provide policy advice to government.

In addition to health and safety functions, branch inspectors address environmental and social sensitivities of proposed and permitted mines. The process for review of *Mines Act* permit applications includes consultation with other government agencies and affected stakeholders, including First Nations, to identify concerns to be addressed through site-specific permit conditions. Inspectors monitor mining activities to ensure compliance with these permit conditions and take enforcement actions if necessary.

During 1998 the branch supported the implementation of the Mining Initiative, a program intended to assist the mining industry during this period of low metal prices. The program included the passage of the *Mining Rights Amendment Act* (the Act), the implementation of the Mineral Exploration Code, the creation of a mining advocate position and the creation of a refundable mineral exploration tax credit.

The *Mining Rights Amendment Act* recognizes the right to mine and assures access to mineral tenures, right to compensation when

mineral tenures are expropriated for parks and timely permitting. The Act amended the *Mineral Tenure Act* to insert a new section 11.1 that authorizes the Chief Inspector of mines to require that the Ministry of Forests issue a special-use permit, subject to certain conditions, to allow access through provincial forest lands to reach approved exploration sites. Furthermore, the Act amended section 38(2) of the *Mines Act* to authorize the creation of regulations respecting applications for, and the issuance of, permit and approvals, including prescribing time limits for steps in the application process.

The Mineral Exploration Code, formally part II of the Health, Safety and Reclamation Code for Mines in B.C., was developed jointly with stakeholders from government agencies, environmental groups, labour and the mining industry. It establishes exploration-specific standards for the protection of the environment and creates a single-agency permit approval process for exploration activities.

The mining advocate position was created in 1998 to investigate and recommend solutions to impediments to the maintenance and growth of the mining industry in the province.

The refundable exploration tax credit permits refunds of 20 per cent of eligible exploration expenditures.

1.3 Land Use

MANDATE/ACTIVITIES

Branch staff participate in all levels of strategic and operational land-use planning throughout B.C. This includes regional, subregional (referred to as LRMP), land-scape unit, local resource use, watershed management, recreational, access management, and sensitive area planning, as well as selection of new protected areas. In addition, various interagency referrals, including commercial recreation applications, proposed road deactivation, and draft *Municipal Act* zoning bylaws are handled. The overall aim is to optimize opportunities for exploration development of the province's subsurface resources in a context that integrates these activities with other land uses.

2.1 Occupational Health Group

ROLES AND RESPONSIBILITIES

The Health, Safety and Reclamation Code for Mines in B.C. (the Code) requires that mine managers develop a written occupational hygiene monitoring program. Larger operations in particular are required to establish procedures and to perform their own measurements of chemical and physical hazards to which workers were exposed in the workplace. This included dusts (total and respirable), noise, gases and fumes, radiation (ionizing and non-ionizing) and heat/cold stress.

The Occupational Health (OH) group provides its expertise in recognizing, evaluating and controlling these conditions and assistance with respect to the development of individual programs. In addition, comparative measurements are made by the group to ensure proper methodology was followed and accurate results are obtained. Underground mine ventilation and workplace hazardous materials information system programs are also included in the group's responsibilities.

In accordance with a recent revision to the Code, mine managers are also required to provide their occupational health and safety committees with training with respect to the prevention and reporting of musculoskeletal disorders. Such disorders include lower back pain, carpal tunnel syndrome and tendonitis.

The OH group was also involved in providing training to occupational health and safety committees at mines in these subjects.

STRUCTURE AND ORGANIZATION

During 1998 there were five persons in the OH group, a manager, three industrial hygiene inspectors and one administrative assistant.

Summary of Activities

There were a wide variety of occurrences and situations in 1998 which required attention from the OH group. Of note were:

- the ongoing investigation of a significant industrial hygiene skin and eye irritation problem at a major open-pit coal mine;
- considerable concern by neighbours of smaller quarry and sand and gravel operations where dust and noise were involved, requiring a number of investigations; and,
- the review of several asbestos abatement projects during building renovations and demolitions at mine sites across the province.

In addition, the OH group:

- completed revisions to the Mines Branch audiometric database, converting it from a mainframe to personal computer-based system; wrote and published an audiometric technician training manual;
- provided training courses for mines' industrial audiometric technicians; and,
- with the assistance of a consultant, conducted a number of seminars across the province to prepare mines for the new requirements in the Code with respect to training programs for musculoskeletal disorder prevention.

In addition to the above, OH inspectors made frequent on-site inspections of mines to fulfill their mandate to monitor workplace conditions.

During the year, 109 inspections were carried out and 191 orders were issued.

2.2 Mechanical Engineering, Electrical Engineering and Emergency Preparedness

Roles and Responsibilities

Mechanical and electrical inspectors ensure that all mechanical and electrical equipment installed and used at mines complies with the *Mines Act* and the applicable codes and standards, and that the equipment is maintained in acceptable condition such that its operation causes no hazard to persons or property.

The emergency preparedness inspector ensures that all mines have an emergency preparedness plan capable of being implemented at any time in response to any emergency occurring at the mine site. Emergency preparedness plans are integrated with a province-wide protocol that provides for aid and assistance from outside sources, if required, to any mine experiencing an emergency.

Structure and Organization

In 1998 there were eight staff in the mechanical/electrical group: one manager, two engineers, four technicians and one administrative assistant.

Summary of Activities

Mechanical Engineering

Inspections were carried out at all of the major mining operations, including the larger quarries and sand and gravel pits.

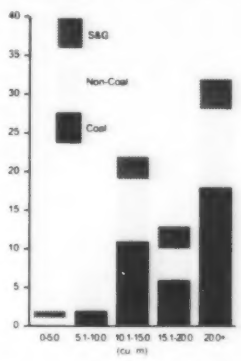
Mine managers were sent a letter in the first quarter of the year requesting that each mine perform a risk analysis of any health and safety problems which could occur as a result of the date change at Jan. 1, 2000 (Y2K problem). Data-activated devices, such as the embedded technology used in production, maintenance, field operations and telecommunications, have a possibility for failure at/or before the start of the year 2000. As the mining industry is highly automated, the likelihood of such devices being present in the many systems employed at mines is high.

Several submissions of data pertaining to new or modified off-highway haul trucks were approved, while numerous minor modifications on various items of mobile equipment were also reviewed with approvals issued in the majority of cases.

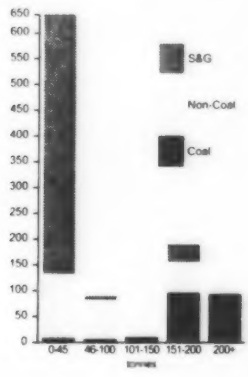
Particulate emissions from diesel engines, especially those operating underground, continued to demand close scrutiny by inspectors. Enhanced engine design, improved fuels, and relatively high ventilation rates have kept the particulate levels within acceptable levels. Attendance was made at the annual Canadian Mining Diesel Conference where trends appeared to indicate that the threshold limit values for diesel particulates will have to decrease within the next few years, providing for a more healthy work environment.

Approval was granted, after an audit of the facility and repair methods, to an engineering shop in British Columbia allowing it to repair certain types of fire resistant and anti-static conveyor belting. This should allow mines that use this special belting to have damaged belts repaired in place of having to scrap the belts. All tests of repair methods were performed in accordance with the requirements of the specific Canadian standard referring to such belting.

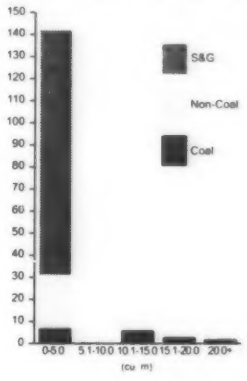
Surface Use of Electric Shovels at Mines



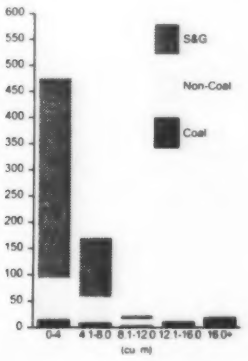
Surface Use of Haul Trucks at Mines



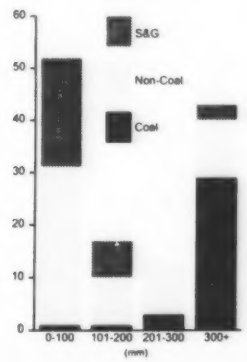
Surface Use of Hydraulic Shovels at Mines



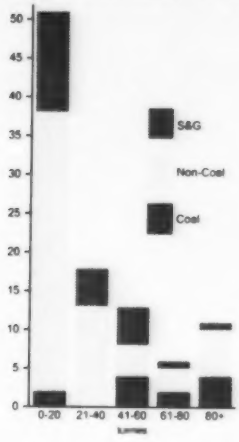
Surface Use of Front-End Loaders at Mines



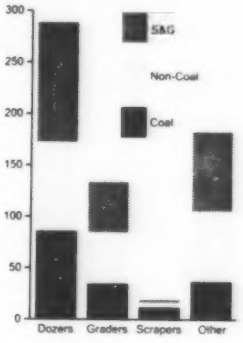
Surface Use of Rotary Drills at Mines



Surface Use of Mobile Cranes at Mines



Surface Use of Other Equipment at Mines



Electrical Engineering

Electrical inspections were conducted at all major mines including the larger sand and gravel operations as well as the smaller operations that demanded an in-depth electrical inspection. Most mines are still continuing to upgrade their electrical equipment and systems in order to increase efficiency and reduce power consumption costs.

The following information describes electrical power consumption at mines in B.C.:

Metalliferous Mines, 1998

Reported power generated at company-owned generating plant, 99,427,667 kW-h

Reported power purchased from public utilities, 1,868,156,511 kW-h

Total Power Consumption 1,967,584,172 kW-h

Coal Mines

Reported power purchased from public utilities, 611,244,067 kW-h

Industrial and Structural Materials

Reported power generated at company-owned generating plants, 6,049,370 kW-h

Reported power purchased from public utilities, 57,520,307 kW-h

Total Power Consumption 63,569,677 kW-h

Emergency Preparedness

Mine emergency preparedness plan guidelines and mine emergency management plans were established in 1991, first published in Oct. 1992 and last updated Jan. 1997. The guidelines are distributed to the mining industry for use in setting up on site preparedness plans. The management plans are distributed to proponents within the plan and for use by ministry staff.

Mine Rescue Stations

Regional mine rescue stations are located in Fernie, Victoria, Kamloops and Smithers. The stations are under the supervision of the regional office administrator/resident engineer in each region and the manager, emergency preparedness, in Victoria.

Mine Rescue Certifications

To qualify for mine rescue certification, the employee of the mine must complete approved training and pass written exams developed for various types of mining, as per Part 3 of the Health, Safety and Reclamation Code for Mines in B.C.

Mines Branch is responsible for certifying miners in several categories of mine rescue, as listed below.

Mine Rescue Certificates issued in 1998:

Type	Number Issued	Re-certified
Survival mine rescue	116	0
Underground mine rescue	39	21
Surface (open-pit) mine rescue	157	97
Gravel pit mine rescue	14	3
Total Certificates Issued	326	121

Mine Rescue Instructor Certificates issued in 1998:

Type	Number Issued	Re-certified
Underground	3	0
Surface (open-pit)	2	0
Total Instructor Certificates	5	0

2.3 Competitions and Awards

Roles and Responsibilities

The primary mandate of the Mines Branch is to ensure worker health and safety, public safety and suitable reclamation and protection of the land and watercourses affected by mining and exploration work.

The *Mines Act* and the Health, Safety and Reclamation Code for Mines in B.C. stipulate the legal responsibility of provincial mining companies in meeting this mandate; however, many B.C. mining companies and their individual workers voluntarily and consistently exceed these legal requirements. Through the efforts of these individuals, companies and staff of the Ministry of Energy and Mines, mining is among B.C.'s safest heavy industries.

Mine rescue competitions, first-aid competitions, and safety awards all contribute to the overall climate of safety. Reclamation awards acknowledge those companies that go beyond what is called for in their mining plans, by conducting superior research and introducing innovative techniques to restore the land.

Mine Rescue Competitions

The provincial mine rescue competitions are judged by branch mine inspectors and industry personnel who are responsible for all aspects of worker and public safety in B.C.'s mining industry. This year's competition was held in Victoria on Jun. 13, 1998.

Surface Mine Rescue Champions

The East Kootenay zone competitions were held in Elkford on May 23, 1998. The participating teams were as follows:

- Manalta Creek Mines – Line Creek Resources
- Fording Coal Ltd. — Fording River Operations
- Fording Coal Ltd. — Greenhills Operations
- Elkview Coal Corp.
- Fording Coal Ltd. — Coal Mountain

The North zone competitions were held in Victoria on Jun. 11, 1998. The participating mines were as follows:

- Endako
- Gibraltar
- Bullmoose
- Quintette Operating Corp.
- Highland Valley Copper

The first, second and third placed teams from each regional zone were eligible to compete in the provincial competition, Jun. 13, 1998 in Victoria. These teams were:

East Kootenay Zone

- Manalta Coal Ltd. – Line Creek Resources
- Fording Coal Ltd. – Greenhills Operations
- Elkview Coal Corp.

North Zone

- Quintette Operating Corp.
- Highland Valley Copper
- Gibraltar

The team from Highland Valley Copper mine won the surface mine competition and are the provincial champions. Team members were: Lori Lovlin (Captain), Dirk Werring (Vice-Captain), Neil Rideout, Dale Konowalchuk, John Brennan, Pete Drechsler, S. Lavigne (Spare) and Reg Malmas (Coach).

Surface Bench Competition

The surface bench competition originated in 1995. The trophy is awarded to the surface mine rescue team that excels at the practical bench competition. The practical bench task is designed to test the individual team members on their knowledge and practical skills in mine rescue equipment and techniques. The competition is held in memory of Maurice Boisse, Mine Rescue

Team Coach, Island Copper Mine. The award was won in 1998 by Manalta Creek Mines – Line Creek Resources.

Underground Mine Rescue Champions

Five underground mine rescue teams competed in the provincial competitions in 1998 as follows:

- Homestake Canada Inc. – Eskay Creek Mine
- Cominco Ltd. – Sullivan Mine
- Boliden Westmin (Canada) Ltd. – Myra Falls Operations
- Prime Resources Group Inc. – Snip Operations
- Quinsam Coal Corporation – Quinsam Mine

Cominco Ltd. – Sullivan Mine team won the underground mine rescue competition, and are the provincial champions. Team members were: Todd Bannister (Captain), Ian Biddlecomb (Vice-Captain), Dave Roe, Todd White, Darryl Orr, Peter Rodenstein, Dave Varty (Spare), and Gerry Fitzpatrick (Coach).

Underground Bench Competition

The underground bench competition originated in 1978. The competition is held in memory of the late Barry Abbott, captain of the Cominco HB mine rescue team, who in 1976 won the Canadian Championship. The award was won by the team from Boliden Westmin (Canada) Ltd. – Myra Falls Operations, Rick Kretzschmar (Captain).

Underground Bench Technician

The underground bench technician plays a very important role prior to and during a mine emergency. The technician is responsible for the care, maintenance and servicing of the mine rescue teams' breathing apparatus. The underground bench technician task was prepared to test the technicians' skills and competency at assembling and testing breathing apparatus. The bench technician competition was won by Wilf Penney of Boliden Westmin (Canada) Ltd. – Myra Falls Operation.

First Aid Competitions

In the first-aid category there are two separate competitions; three-person first-aid competition; and the first-aid component of the underground and surface mine rescue competition.

Three-Person First Aid

The first provincial miner's three-person first-aid competition was held in 1978. The competition simulates accident situations — one team member acts as the patient and the other two team members render first aid. The St. John's standard course is the training standard, and only those who work in or about a mine are permitted to enter this competition.

This competition was designed as an extension of training for workers in basic first-aid skills, in order that they may assist their fellow worker at the face or at the work place in the event of an injury or medical emergency.

Competing teams at the provincial level were as follows:

- Gibraltar
- Bullmoose Operating Corp.
- Quintette Operating Corp.
- Elkview Coal Corp.
- Cominco – Sullivan Mine
- Cominco – Sullivan Concentrator

The 1998 champions were the team from Cominco – Sullivan Concentrator. The team members were Mike Waites (Captain), Dale Wesche, Jerry St. Jean and Larry Carlson (Coach).

First-Aid Component

The judging of the first-aid component is held in conjunction with the provincial surface and underground mine rescue competition.

The National Western Regional Competitions

To improve Canada's mine rescue mutual aid response capability, the national mine rescue committee, consisting of representatives from across Canada, divided the country into three specific regions –

East, Central and West. The rationale is based on the expediency of responding with teams and equipment from adjacent provinces and territories and to coordinate procedures within those jurisdictions.

The national western regional committee, consisting of representatives from Alberta, B.C., Saskatchewan, Northwest Territories, United States and the Yukon Territories, in conjunction with the city of Fernie (sponsor of the event), initiated underground and surface mine rescue competitions in 1993. The competitions are conducted on a biennial basis and serve to provide a medium for mine rescue teams to exercise their skills and to promote an interchange of procedures and training standards.

The Fourth National Western Regional Mine Rescue Competition will be held in Fernie, B.C. on Sept. 10 and 11, 1999.

The teams eligible to compete in 1999 are the underground and surface mine rescue winners from the 1998 and 1999 provincial, territorial and United States competition events. The winning teams in 1998 from B.C. were:

- Cominco Ltd. — Sullivan Mine (Underground)
- Highland Valley Copper (Surface)

Safety Awards Competitions

The presentation of awards at the 37th (1998) Annual Mine Safety Awards will take place at the Harbour Towers Hotel in Victoria on Apr. 19, 1999. The winners for 1998 were as follows:

Small Underground Mines

This award was donated by the West Kootenay Mine and Industrial Safety Association in 1951 to encourage and promote safety in small underground mines. Since 1956, the competition has been open to qualifying mines throughout the province. The award is given to the mine having the lowest compensable accident rate after working from 2,500 to 30,000 shifts per year; at least one third of which were underground. The mine must have operated for at least nine months during the calendar year. A fatality automatically disqualifies a mine for that year.

No team qualified for 1998.

Open-Pit Mines and Quarries

The John Ash Award is presented to the mine that has worked more than 1,000,000 hours and attained the lowest compensable injury frequency rate. The 1998 winner was Highland Valley Copper.

The Edward Prior Safety Award is presented to the mine with the lowest compensable injury frequency rate for 200,000 to 1,000,000 hours worked. This award was won by Fording Coal Ltd. – Greenhills Operations, for the fourth consecutive year.

The Stewart-O'Brian Safety Award is presented to the mine with the lowest compensable injury frequency rate for 35,000 to 200,000 hours worked. The award was shared by three mines:

- Mainland Sand and Gravel Ltd. – Cox Station Mine #700104
- Steelhead Aggregates Ltd. – Chilliwack Division
- Westroc Inc. – Windermere Mining Operations

Certificates of Achievement

Certificates of achievement are presented to those mines with a zero compensable injury frequency rate and which have accumulated 15,000 to 35,000 employee hours. There were a total of seven mines that qualified for certificates:

- Allard Contractors Ltd. – Haney Pit
- Coquitlam Sand and Gravel Ltd. – Pit #0700468
- Jack Cewe Ltd. – Heather Construction
- Plateau Construction Ltd. – Harper Ranch Lime Quarry
- Shawnigan Gravel Supplies Ltd.
- Steelhead Aggregates Ltd. – Abbotsford Division
- West Coast Aggregates Ltd. – Pit #12

Joint Occupational Health and Safety Committee

This award is presented to the occupational health and safety committee at a mine that has demonstrated excellence in its operations, enhanced worker safety awareness and/or made significant improvements in co-operative internal concern for mine safety. The 1998 award went to Elkview Coal Corporation.

National Safety Awards — John T. Ryan Trophies

The John T. Ryan trophies are awarded by the Mine Safety Appliances Canada Limited as a memorial to the founder of the company. The Canada trophies are awarded by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) to the metal mine, the coal mine and the select mine which in the previous year experienced the lowest number of compensable accidents per million employee hours in all of Canada. There are two trophy categories, Canada and Regional.

Metalliferous Underground Mines

Awards for this category include a Canadian trophy and four regional trophies. B.C. mines compete in the B.C. and Yukon region.

In 1998 the Canada winner was Cogema Resources Ind., Cluff Lake Mine, Saskatoon, Saskatchewan. The regional winner from B.C. and Yukon was Homestake Canada Inc. – Eskay Creek Mine.

Coal Mines

This award is restricted to underground mines. There is a single Canadian trophy in this category. In 1998 there were three winners:

- Fording Coal Limited – Genesee Operations, Alberta
- Forestburg Collieries (1984) Ltd. – Paintearth Mine, Alberta
- N.B. Coal Limited – Minto, New Brunswick

Select Mines

Awards for this category are restricted to open-pit and strip mines for any mineral (excluding coal). There is a Canadian trophy and two regional trophies awarded. B.C. mines compete in the western region, which includes all of Canada west of the Manitoba-Ontario border. In 1998 the award was won by Syncrude Canada Ltd. The 1998 Canada trophy was won by Fording Coal Limited, Mildred Lake Operations, Fort McMurray, Alberta.

2.4 Examinations and Certifications

Section 26 of the *Mines Act* requires that every person employed at a mine, where required by the Code, be under the daily supervision of a person who holds a valid and appropriate certificate as required by the Code. The appropriate certification is specified in Part 1.12 of the Code. Recipients of a valid permanent certificate require re-examination every five years regarding their current knowledge of the Code.

Board of Examiners

The Board of Examiners comprises the Chief Inspector of Mines as chair and other inspectors appointed by the Chief Inspector. In 1998 F.W. (Fred) Hermann chaired the board, with R. Booth, R. Bone, B. Good, E. Mehr and J. Worsfold (administrator) as members. The board is responsible for examination of applicants for shiftboss certificates and certificates of competency, for considering applications for interchange certificates of competency, for issuing certificates and for conducting a review of all suspended certificates. The board is also responsible for administering blasting and supervisor certification.

Shiftboss Certificates

Seven different types of shiftboss certificates are issued:

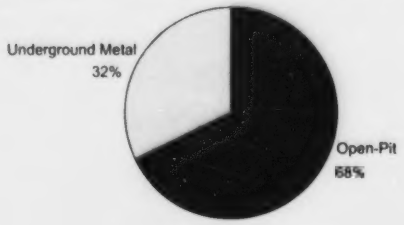
- Open-pit
- Open-pit restricted (sand and gravel pit)
- Open-pit restricted (placer)
- Underground metal

- Underground restricted (crushing and conveying)
- Underground restricted (placer)
- Underground coal (statistics included under Certificate of Competency)

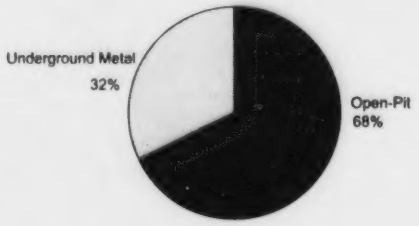
A provisional certificate, which may be issued on a one-time basis, is valid for a period of six months.

An applicant for a shiftboss certificate must hold an appropriate blasting certificate if blasting is carried out, a mine rescue certificate (surface or underground as required), and a valid first-aid certificate. The applicant must also have obtained acceptable experience in and about a mine and pass a written examination on knowledge of the *Mines Act* and the Code.

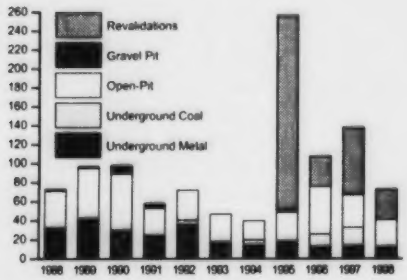
New Shiftboss Certificates Issued by Type 1998



Revalidated Shiftboss Certificates Issued by Type 1998



Shiftboss Certificates Issued by Type 1988 - 1998



Under part 1.13.10(1) of the Code, a holder of a shiftboss certificate must revalidate every five years. This is accomplished by successfully writing an examination on knowledge of the *Mines Act* and the Code as well as holding valid appropriate supporting certifications (blasting, mine rescue and first aid).

Total Shiftboss Certification Activity 1998

Activity	New Certificates	Revalidation
Applications received	74	38
Examinations written	58	37
Number passed	50	37
Number of permanent certificates issued	41	32
Provisional certificates issued	14	0

Shiftboss Certificate Suspensions (Part 1.13.12 of the Code)

There were four shiftboss certificates suspended during 1998.

1. Underground Certificate #UG2191: suspended Jan. 26, 1998, under part 1.13.3 (2) Health, Safety and Reclamation Code for Mines in B.C. (the Code) as the employee did not have a current B.C. mine rescue certificate.

   Reinstatement requirements: Must fulfill mine rescue requirement before a shiftboss certificate can be revalidated.

2. Open-Pit shiftboss certificate #OP1101: suspended for one month (Aug. 27, 1998 - Sept. 26, 1998) – for contravention of parts 1.8.2 and 1.10.2 of the Code regarding wearing personal protective equipment and permitting a worker to perform work which is or could create an undue hazard to his safety. An attempt to remove a wedge using chipping and small sledge hammers without wearing safety goggles resulted in an eye injury to the worker.

   Reinstatement requirements: None stated.

3. Open-Pit shiftboss certificate #OP1145: automatically suspended for six months (Nov. 2, 1998 - May 2, 1999) – as a result of the suspension of blasting certificate #40688 for the same period.

   Reinstatement requirements: None indicated unless, upon review, the Chief Inspector deems otherwise.

4. Underground Coal certificate #UGC 11: suspended for two weeks (Dec. 7 - 20, 1998) - for violating part 1.10.2 of the Code for exposure to a dangerous situation by working under unsupported roof. The worker also violated the mine's published and posted safety rules.

   Reinstatement requirements: None indicated other than a review of the mine's safety rules and suggesting changes where the worker feels the rules are impractical.

Certificates of Competency

Managers and certain other supervisory officials at an underground coal mine, when required by the Chief Inspector must hold a certificate of competency. Three types of certificate are issued:

- a first-class certificate which is required when 30 or more persons are employed underground;
- a second-class certificate which is required when fewer than 30 persons are employed underground; and,
- an underground coal shiftboss certificate may be used if fewer than 10 persons are employed.

An applicant for a certificate of competency must hold the necessary academic certification, have obtained acceptable experience and must pass written examinations on mining practice and technology and on knowledge of the *Mines Act* and the Code. An interchange certificate may be granted to an applicant who holds an equivalent certificate granted by a jurisdiction outside the province, when they have proven their knowledge of the Code.

During 1998, no first or second class certificates of competency were issued. No revalidations were processed.

Total Underground Coal Shiftboss Certification

No new activity in 1998.

Supervisor Certificates

Every worker, other than those supervised by a shiftboss or the holder of a certificate of competency, and other than office employees, must work under the supervision of the holder of a supervisor certificate. Currently, four types of supervisor certificate are issued:

- Open-pit
- Sand and gravel or placer
- Underground
- Exploration

These four replace the previous 12 categories to better recognize that the workforce can, and does, move about the mine site.

Where 12 workers or less are employed in a surface mine operation, supervision by the holder of a supervisor certificate, rather than the shiftboss certificate, may be acceptable.

An applicant for a supervisor certificate may be required to hold a valid first aid certificate and must pass a written examination on knowledge of the *Mines Act* and the Code. A provisional certificate, which may be issued on a one-time basis by the mine manager, is valid for a period of six months.

A supervisor certificate must be revalidated every five years (part 1.13.10(2) of the Code) by successful examination on knowledge of the *Mines Act* and the Code. The holder may also be required to hold a valid first-aid certificate.

SUPERVISOR CERTIFICATE STATISTICS ACTIVITY 1998

	New	Revalidated
Applications received	574	261
Examinations written	551	267
Number passed	545	262
Number of permanent certificates issued	533	261
No. of provisional cert. issued	36	0

Supervisor Certificate Suspension (Part 1.13.11 of the Code)

There were two supervisor certificates suspended during 1998 which resulted in a cancellation of one certificate.

1. #95-2207: suspended 30 days (May 30 - Jun. 30, 1998) – for violation of part 4.4.1 of the Code due to a lack of fall protection on personnel under his supervision. An accident occurred which caused injury.

   Reinstatement requirements: During the time of suspension, the employee was relieved of his supervisory role, transferred to a different shift and required by the company to review/revise safe work procedures for the maintenance department focusing on, but not limited to, procedures involving lock-outs and fall protection requirements.

2. #97-2988: suspended six months (Sept. 15, 1998 - Mar. 15, 1999) – for violation of part 3.1.3 of the Code prohibiting fighting, horseplay, scuffling on a minesite by verbally abusing and physically assaulting another worker.

   Reinstatement requirements: On review of the incident by the Chief Inspector, this certificate has been canceled for a period of two years. The applicant is not eligible to apply for either a supervisor or shiftboss certificate prior to Sept. 15, 2000.

Other conditions were imposed for reapplication:

1. The mine manager be advised of the cancellation of the previous certificate and the reason for the cancellation;
2. Written endorsement by the mine manager is required; and,
3. Application must show the previous cancellation and the reason.

Blasting Certificates

Blasting certification is covered under part 8.2 of the Code. Types of blasting certificates are:

- Basic
- Exploration
- Surface
- Underground
- Underground coal
- Electrical
- General-which includes all categories

Blasting certificates do not have an expiry date. Provisional certificates can be issued for a period not exceeding 90 days. During 1998, 134 blasting certificates were issued.

Blasting Certificate Suspensions (Part 8.2.6, 8.2.7 of the Code)

Three blasting certificates were suspended during 1998:

1. #39114: suspended for one month (Aug. 27, 1998 - Sept. 26, 1998), – for violation of the Code parts 1.8 and 1.10.2 which was a result of the suspension of the applicant's open-pit shiftboss certificate #OP1101.

   Reinstatement requirements: To successfully rewrite a blasting examination.

2. #40737: suspended for three months (Nov. 2, 1998 - Feb. 2, 1999), – for violation of the Code parts 8.5.12 and 8.5.13, requiring a blast area to be clearly identified and prohibits equipment within eight metres of any charged blasthole site.

   Reinstatement requirements: A blasting examination must successfully be written before the end of the suspension period.

3.#40688: suspended for six months (Nov. 2, 1998 - May 2, 1999) – for violation of the Code parts 8.5.12 and 8.5.13, requiring a blast area be clearly identified and prohibits equipment within eight metres of any charged blasthole site.

Reinstatement requirements: will automatically take place May 2, 1999 unless the Chief Inspector deems otherwise after review of the incident (also resulted in automatic suspension of shiftboss certificate #OP1145).

One Reprimand:

Blasting certificate #40880 - received a reprimand (note to file) Nov. 1998

For violating parts 8.4.2 and 8.4.3 of the Code regarding the transportation of explosives and breached the mine's operating procedures. The matter was handled internally at the mine by review of procedures. No suspension of the blasting certificate was given by the District Inspector.

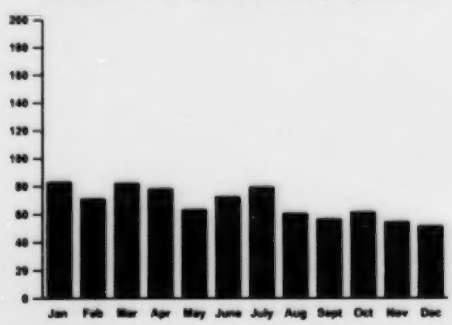
2.5 Accidents and Incidents

Accidents

The provincial mine information system in the Mines Branch reports 545 accidents and 309 days lost in 1998. The next graph is an analysis of the number of accidents by months of the year.

The following charts and graphs are an analysis of the kinds of mining injuries and accidents that occurred in 1998.

Accidents Causing Death or Injury by Month



Examinations were by diverse variables: cause, occupation, parts of the body, age, seniority, job experience, industry experience, location, hours into shift, overtime, shift patterns, shifts worked, contributing factors, preventative actions, source and nature of injury.

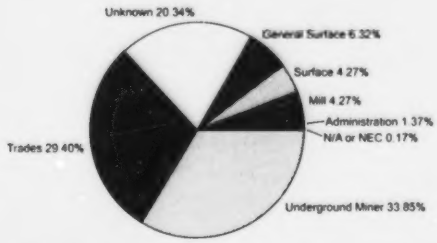
Accidents Causing Injury or Death Classified by Cause

CAUSES	NO.	PERCENTAGE
Equipment, material characteristics	338	42.14
Guarding	18	2.24
Clothing and personal protective equipment	36	4.49
Confinement	59	7.36
Environment	91	11.35
Structural	64	7.98
Working surface	102	12.72
Procedures	325	40.52
Speed	28	3.49
Position, posture	97	12.09
Vehicle operator error	33	4.11
Loading, placement	27	3.37
Unsafe mixing, combining, warning, securing	24	2.99
Abuse	2	0.25
Equipment, tool usage	56	6.98
Communications	41	5.11
Bypassing safety devices	30	3.74
Improper use of body	126	15.71
*N/A, NEC	69	8.60
**Unknown	18	2.24

*N/A – not elsewhere classified
**Unknown – not enough information provided to properly classify.

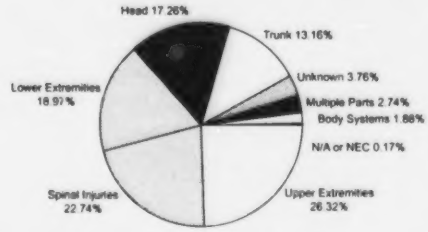
Note: The numbers shown in the table above are not intended to add up to 100 per cent as there may be several causes for one accident.

Accidents Causing Injury or Death Classified by Occupation



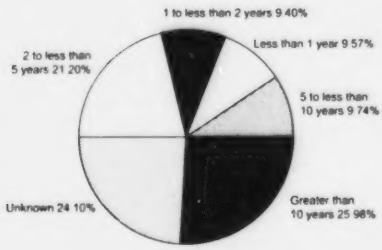
OCCUPATION	NO.	PERCENTAGE
Administration	8	1.37
Underground Miner	198	33.85
Surface	25	4.27
Mill	25	4.27
Trades	172	29.40
General Surface	37	6.32
N/A,NEC	1	0.17
Unknown	119	20.34

Accidents Causing Injury or Death Classified by Parts of the Body



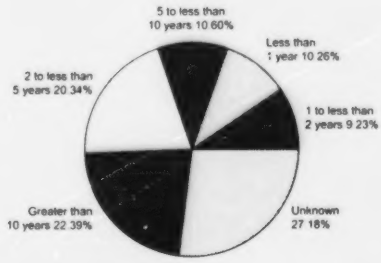
PART OF BODY	NO.	PERCENTAGE
Head	101	17.26
Spinal Injuries	133	22.74
Upper Extremities	154	26.32
Trunk	77	13.16
Lower Extremities	111	18.97
Multiple Parts	16	2.74
Body Systems	11	1.88
N/A, NEC	1	0. 17
Unknown	22	3.76

Accidents Causing Injury or Death Classified by Seniority


1 to less than 2 years 9.40%
Less than 1 year 9.57%
2 to less than 5 years 21.20%
5 to less than 10 years 9.74%
Unknown 24.10%
Greater than 10 years 25.98%

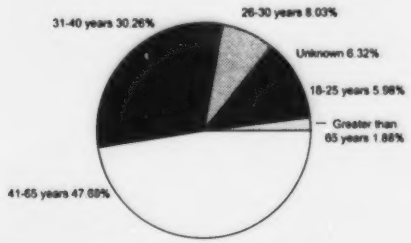
SENIORITY	NO.	PERCENTAGE
< 1 year	56	9.57
1 to < 2 yrs	55	9.40
2 to < 5 yrs	124	21.20
5 to < 10 yrs	57	9.74
> 10 yrs	152	25.98
Unknown	141	24.10

Accident Reports by Job Experience


5 to less than 10 years 10.60%
Less than 1 year 10.26%
2 to less than 5 years 20.34%
1 to less than 2 years 9.23%
Greater than 10 years 22.39%
Unknown 27.18%

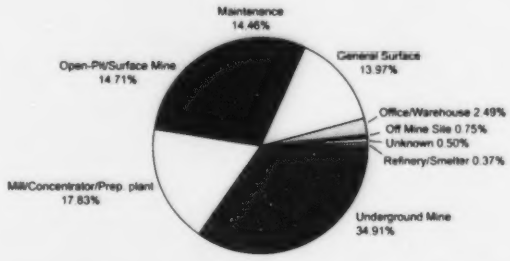
JOB EXPERIENCE	NO.	PERCENTAGE
Less than 1 yr	60	10.26
1 to < 2 yrs	54	9.23
2 to < 5 yrs	119	20.34
5 to < 10 yrs	62	10.60
> 10 yrs	131	22.39
Unknown	159	27.18

Accident Reports by Age Groupings



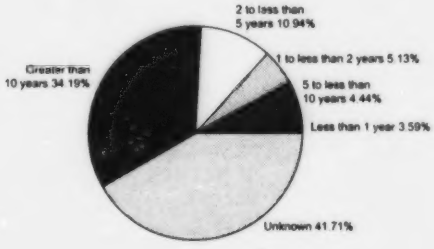
AGE	NO.	PERCENTAGE
< 18 yrs	0	0
18-25 yrs	35	5.98
26-30 yrs	47	8.03
31-40 yrs	177	30.26
41-65 yrs	279	47.69
> 65 yrs	11	1.88
Unknown	1	6.32

Accident Reports by Location



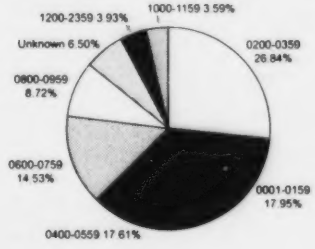
LOCATION	NO.	PERCENTAGE
General Surface	112	13.97
Maintenance	116	14.46
Mill/Concentrator/Prep. Plant	143	17.83
Off mine site	6	0.75
Office/Warehouse	20	2.49
Open-Pit Mine/Surface Mine	118	14.71
Refinery/Smelter	3	0.37
Underground Mine	280	34.91
Unknown	4	0.50

Accident Reports by Industrial Experience


2 to less than 5 years 10.94%
1 to less than 2 years 5.13%
Greater than 10 years 34.19%
5 to less than 10 years 4.44%
Less than 1 year 3.59%
Unknown 41.71%

INDUSTRIAL EXPERIENCE	NO.	PERCENTAGE
> 1 yr	21	3.59
1 to < 2yrs	30	5.131
2 to < 5 yrs	64	10.94
5 to < 10 yrs	26	4.44
> 10 yrs	200	34.19
Unknown	244	41.71

Accident Reports by Hours into Shift



HOURS INTO SHIFT	NO.	PERCENTAGE
0001-0159	105	17.95
0200-0359	157	26.84
0400-0559	103	17.61
0600-0759	85	14.53
0800-0959	51	8.72
1000-1159	21	3.59
1200-2359	23	3.93
Unknown	38	6.50

Accident Reports by Overtime

OVERTIME	NO.	PERCENTAGE
Yes	18	3.08
No	559	95.56
Unknown	8	1.37

Accident Reports by Number of Shifts Worked

NO. OF SHIFTS WORKED	NO.	PERCENTAGE
First	92	15.73
Second	97	16.58
Third	90	15.38
Fourth	60	10.26
Fifth	10	1.71
Sixth	3	0.51
More than six	12	2.05
Unknown	221	37.78

Accident Reports by Contributing Factors

CONTRIBUTING FACTORS	NO.	PERCENTAGE
Personal traits	594	74.06
Training	31	3.87
Industrial relations	6	0.75
Rules and regulations	57	7.11
Management traits	16	2.00
Design, layout	220	27.43
Policies and procedures	49	6.11
Maintenance	36	4.49
N/A, NEC	103	12.84
Unknown	55	6.86

Note: The numbers in the table shown above are not intended to add up to 100 per cent as there may be several contributing factors for one accident.

Preventative Actions Report

PREVENTATIVE ACTIONS (Actions to improve)	NO.	PERCENTAGE
Housekeeping program	29	3.62
Inspections	37	4.61
Lighting	2	0.25
Maintenance program (equipment)	35	4.36
Ventilation	6	0.75
Appropriate safety contact to employees and record	212	26.43
Assigned additional help	6	0.75
Clean or clean up (incl. sanding, salting)	29	3.62
Design or construction	91	11.35
Correction of unnecessary congestion, relocate	21	2.62
Disciplinary action against person(s) involved	14	1.75
Discussed proper procedure with employee	267	33.29
Equipment/building repair or replacement	44	5.49
Establish closer supervision	17	2.12
Establish group meetings	27	3.37
Establish off-the-job training	1	0.12
Establish or revise safe job procedure	107	13.34
Establish planned job observation	9	1.12
Halted job until conditions improve	9	1.12
Inform all departmental supervision	88	10.97
Installation of guard or safety device	21	2.62
No action taken	28	3.49
Order use of safer materials	24	2.99
Preventative action, NEC	36	4.49
Reassignment of person(s)	6	0.75
Supply of new or improved personal protective equipment	11	1.37
Training/retrain person[s] (school)	12	1.50
Under investigation	17	2.12
Undetermined	54	6.73
N/A (Not Applicable)	33	4.11
Unknown	46	5.74

Note: The numbers in the table shown above are not intended to add up to 100 per cent as there may be several preventative actions for one accident.

Accident Reports by Source

SOURCE	NO.	PERCENTAGE
Concentrating/maintenance equipment	40	6.84
Electrical	22	3.76
Mining equipment	121	20.68
Miscellaneous	53	9.06
People/animals/action	82	14.02
Physical conditions	78	13.33
Structures	23	3.93
Substances	145	24.79
Tools	88	15.04
Vehicles (except haulage)	30	5.13
N/A, NEC	29	4.96
Unknown	18	3.08

Note: The numbers in the table shown above are not intended to add up to 100 per cent.

Accident Reports by Nature of Injury

NATURE OF INJURY	NO.	PERCENTAGE
N/A, NEC	4	0.68
Amputation or enucleation	6	1.03
Asphyxia, strangulation, drowning	2	0.34
Burn (chemical)	7	1.20
Burn or scald (heat) contact with hot substances	11	1.88
Concussion - brain, cerebral	3	0.51

Contusion, crushing, bruise - intact skin surface	106	18.12
Cut, laceration, puncture - open wound	87	14.87
Dislocation	4	0.68
Electric shock	3	0.51
Fracture	21	3.59
Hearing loss or impairment (a separate injury)	1	0.17
Heart attack, stroke	2	0.19
Heat stroke, sunstroke, heat cramps, heat exhaustion	-	-
Hernia, rupture (incl. both inguinal and non-inguinal)	4	0.68
Multiple injuries	13	2.22
Poisoning, systematic	1	0.17
Scratches, abrasions, (superficial wounds)	17	2.91
Sprains, strains	250	42.74
INFLAMMATION/IRRITATION		
Bursitis, tenosynovitis, synovitis	2	0.34
Conjunctivitis	26	4.44
Dermatitis	3	41
Inflammation or irritation of respiratory system	5	0.85
Industrial disease	1	0.17
Carpal tunnel syndrome	2	0.34
RADIATION		
Radiation effects, includes sunburn	2	0.34
Undetermined	2	0.34
N/A (Not Applicable)	15	2.56
Unknown	0	3.76
Under Investigation	2	0.34

Dangerous and/or Unusual Occurrences

Incorporated into the Mine Accident Reporting System (MINACC) upgrade in Dec. 1992 was the ability for mines to enter their own accident codes. For the period Jan. - Oct. 1993 MINACC mines were given the opportunity to add their own user codes into the accident code tables. The codes were then extensively reviewed by Mines Branch personnel and new code tables defined. This review resulted in a huge reduction in the number of accident codes. Once the conversion program was written to convert old codes into the new code table, the new code table and user handbooks were released in May 1994.

During May - Oct. 1994, a contractor was hired to visit all mine sites using MINACC. The visit was used to ensure MINACC was operating in all mines and to address any issues/concerns MINACC users may have with the systems usage. The contractor reviewed the ministry's reporting requirements and assisted in obtaining the accident and mine hours worked information. The contractor gathered suggestions for system revisions or additions from MINACC users. A final report and recommendations document was presented to the Chief Inspector and to the manager, mining operations in Nov. 1994.

This was followed up in 1995 by an internal review of MINACC to better establish our internal priorities and requirements to compliment the contractor's review.

As a result of these findings a program was developed to create an annual MINACC report of the statistics provided by the mines.

1998

ACCIDENT STATISTICS	NO.	PERCENTAGE
Dangerous occurrences	131	16.33
Geotechnical incidents	24	2.99

1998

INJURY STATISTICS	NO.	PERCENTAGE
Medical Aid	490	83.76
Modified Work	89	15.21
Lost Time	141	19.11
Fatality	3	0.51
First Aid	173	29.57
Unknown	17	2.91

2.6 Inspection Services

Mining inspectors monitor mining activity for adherence to mining legislation and operating permits. The following pages provide summaries of the production, employment and inspection activities for all major B.C. mines in 1998.

Metal Mines

Production and Employment at Major B.C. Mines, 1998

Region Mine/Owner or Operator	Tonnes Milled	Principal Mineral	Total Average Employment
Vancouver Island			
Myra Falls Operations/Westmin Res. Ltd.	1,046,835	copper, lead, zinc, gold, silver	442
Thompson-Okanagan			
Highland Valley Copper/Highland Valley	23,210,335	copper, molybdenum, gold, silver	1,112
Kootenay			
Sullivan/Cominco Ltd.	1,013,170	lead, zinc, silver	694
Cariboo			
Gibraltar/Gibraltar Mines Ltd.	12,393,629	copper, gold, silver, molybdenum	288
***Mount Polley	5,829,701		179
Quesnel River (QR)/Kinross Gold Corp.	87,000	gold	95
Northwest			
*Eskay Creek/Prime Resources Group Inc.	257,818	gold, silver	145
**Golden Bear/North American Metals Corp.	385,000	gold, silver	80
Huckleberry	6,591,645		214
***Premier/A20 Westmin Resources Ltd.		gold, silver	10
Snip/Prime Resources Group Ltd.	156,000	gold	155
Northeast			
Blackdome/Claimstaker Resources Ltd.	3,900	gold, silver	80
Endako Mines Division/Placer Dome Inc.	9,168,589	molybdenum	285
Kemess/Royal Oak Mines	12,000,000	copper, gold	350
Total Metal	**71,907,952**		**4,152**

*Eskay had no mill until recently. The numbers are tonnes ore crushed.

** Premier: mining closed, mills Snip ore.

*** Golden Bear: tonnes mined.

Coal Mines

Production and Employment at Major B.C. Mines, 1998

Region Mine/Owner or Operator	Tonnes Milled	Total Average Employment
Vancouver Island		
Quinsam/Hillsborough Resources Ltd.	939,234	210
Kootenay		
Coal Mountain Operations/Fording Coal Ltd. formerly (Byron Creek)	3,032,465	191
Elkview/Elkview Coal Corp.	4,643,966	575
Fording River/Fording Coal Ltd.	12,168,019	808
Greenhills/Fording Coal Ltd.	5,737,848	499
Line Creek/Line Creek Resources Ltd.	4,237,241	510
Northeast		
Bullmoose/Bullmoose Operating Corp.	2,622,2606	412
Quintette/Quintette Coal Ltd.	4,985,556	856
Total Coal	**38,366,589**	**4,061**

Volume of Inspections

The following figures represent inspections performed by the Mines branch. When an inspector conducts a mine site inspection on behalf of the branch, the inspector passes on to other branches anything that they may need to attend to. Note that the number of inspections is not a good indicator of the relative volume of activity of each office. Some regions contain a few very large mining operations, whereas others contain hundreds of smaller operations. Therefore, the length of time it actually takes to conduct an inspection, varies from region to region.

While conducting inspections during 1998, mines inspectors issued 5,357 orders and shut down 61 pieces of equipment. Future year statistics will include these statistics for inspectors from all branches.

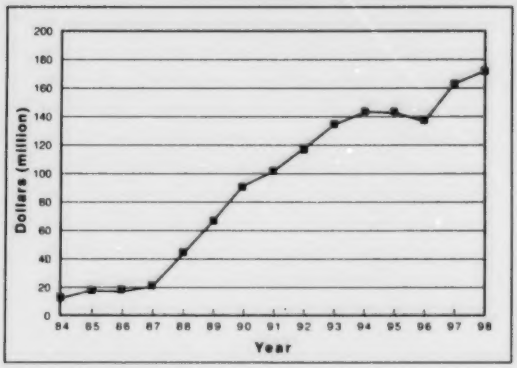
Volume of Inspections, 1998

Inspection	Smithers	Pr. Grge.	Cranbrook	Kamloops	Nanaimo	Van/Vic	Total
Coal-Surface	14	49	7	2	33		105
Coal-Underground		18		11	11		40
Exploration-Surface	101	20	37	79	18	2	257
Exploration-Underground	6	1	15	3			25
Quarry-Mineral	10	31	6	16	16		79
Quarry-Non Mineral	66		13	133	19		231
Industrial minerals-underground	1		16		4		21
Metal-Surface	37	41	4	24	6	58	170
Metal-Underground	36	6	13	12	6	30	103
Placer-Surface	82	70	11	48	10		221
Sand & Gravel/Quarries	289	109	66	154	439	36	1093
Abandoned	2		7	4	18	13	44
Other	5	5	23	4			37
Totals	625	276	267	373	663	222	2426

3.1 Inspections

Inspections carried out by all members of the regional operations, health and safety are included in the statistics reported under volume of inspections in the Mines Branch section of this report.

Reclamation Security Deposits held in B.C.
1984 - 1998



3.2 Notices of Work

Type/Region	Southwest	Central	Kootenays	Northeast	Northwest	Totals
Mineral Exploration	62	155	116	120	130	583
Placer	22	78	53	409	111	673
Quarry	13	5	12	12	4	46
Sand & Gravel	26	26	14	47	21	134
Coal Exploration	1	1	13	0	2	17
Totals	**124**	**265**	**208**	**588**	**268**	**1453**

Southwest = Nanaimo, Lower Mainland and Vancouver Island areas
Central = Kamloops, Okanagan and Thompson areas
Kootenay = Cranbrook and Elk Valley areas
Northeast = Prince George, Omineca, Horsefly and Valemont areas
Northwest = Smithers, Skeena and Queen Charlotte areas

4.1 Reclamation

Roles and Responsibilities

In B.C., environmental protection and reclamation is a major component of all mineral exploration and mine development activity. Since 1969, mining companies have been required by law to reclaim all lands disturbed by mining. B.C. was one of the first jurisdictions in Canada to enact mine reclamation legislation, and the first to extend this policy to exploration sites. Mine companies are required to obtain a reclamation permit and place a security deposit with the province. These deposits are held in trust until reclamation is completed.

The reclamation section is responsible for:

- providing detailed technical review of projects under the *Environmental Assessment Act*;
- reviewing and issuing permits under section 10 of the *Mines Act*;
- inspecting mine reclamation;
- administering reclamation security deposits on behalf of the provincial government; and,
- participating in selected committees and activities to enhance mine reclamation in the province, including the technical and research committee on reclamation, the BCMEM expert advisory committee for ML/ARD, and the national mine environment neutral drainage committee.

Structure and Organization

The section works closely with industry, other government agencies, First Nations and the public to ensure that all concerns are addressed. For reclamation permits involving mechanical disturbance of the land surface, applications are referred to other government agencies, the public, and First Nations where their interests are affected.

Cooperation between industry, government, and the academic community through the research committees ensures information exchange and dissemination of new technology.

Summary of Activities

Reclamation Section Highlights

The ministry believes that improved technical review along with increased public access to information, greater public involvement in decision-making processes and more specific regulations will achieve a greater degree of environmental protection and improved reclamation standards.

Significant achievements during 1998 included:

Metal Leaching and Acid Rock Drainage — the ministry has greatly improved the management of metal leaching and acid rock drainage (ML/ARD) at mines through issuance of a ML/ARD policy, guidelines for ML/ARD at minesites in B.C., and a manual of recommended methods for prediction of ML/ARD. The BCMEM expert advisory committee continues to advise the branch on revisions to improve the acid rock drainage policy and guidelines.

Reclamation Securities and Funds

All mines operating in B.C. must deposit security with the government to ensure that reclamation costs do not fall on provincial taxpayers (i.e., if a mining company goes bankrupt). In the past few years, the value of security deposits has increased to reflect more closely the true costs of reclamation. The total value of securities held by the province rose from $10 million in 1984 to more than $172 million at fiscal year end Mar. 31, 1998.

Review of Security Policy

During 1998, the reclamation security policy committee reviewed and recommended the use of surety bonds as an acceptable form of security and a surety bond form was developed and used on a trial basis.

Research Committees/Activities

BCMEM Expert Advisory Committee

The BCMEM expert advisory committee, chaired by the ministry, co-ordinates provincial research into solving acid rock drainage problems. Members of the committee assisted the national mine

environment neutral drainage committee program in hosting the 5th annual metal leaching and ARD workshop on risk assessment and risk management, in Vancouver, Dec. 1998.

B.C. Molybdenum Research Subcommittee
Chaired by the ministry, the subcommittee managed one research program involving "A Study of the Effects of Supranormal Dietary Molybdenum Levels on Reproduction in Beef Heifers." This study was sponsored in part by Brenda and Endako mines.

Mine Environment Neutral Drainage (MEND) Prediction, Prevention, Control and Management Committees
Branch staff participated on the board of directors to assure B.C.'s concerns were addressed. Several reports managed by branch staff included: "The Assessment of the Subaqueous Disposal of Oxidized Waste Rock", "Methods to Delay the Onset of ARD", and "Blending and Layering of Waste Rock, a Case Study."

Mine Reclamation Symposium

The 22nd Annual Mine Reclamation Symposium was held Sept. 14 to 17, 1998, in Penticton, B.C. The symposium addressed "Mine Reclamation and Remediation." Delegates also toured the Penticton biosolids composting facility and the recently reclaimed mines at Nickel Plate and Similco, and the reclaimed lands of the old Granby tailings near Princeton.

The Annual B.C. Mine Reclamation Award
The annual reclamation award and up to five citations are awarded for outstanding achievement in mine reclamation and have been presented every year since 1977.

In 1998, the annual reclamation award was presented to BHP Minerals (Canada) Ltd., Island Copper mine, for outstanding reclamation in which all remaining mine and waste disposal areas had been reclaimed to stable, productive landscapes which are virtually maintenance free. Also included was an innovative design for a meromictic lake for use as a passive treatment of acid rock drainage.

Citations were awarded in four categories:

- Coal mine reclamation — was awarded to Quintette Operating Corp. for reclamation at the Tumbler Ridge operations in which unique reclamation techniques have been utilized to incorporate natural successional processes and the re-establishment of wildlife habitat.
- Metal mine reclamation — was awarded to Afton Operating Corp., for their excellent reclamation program which is expected to achieve sustainability well beyond provincial requirements at the Afton and Ajax mines. Reclamation has been done with the aim of restoring natural topography and reclaiming natural systems.
- Sand and gravel reclamation — was awarded to LaFarge Canada Inc., for the relaxation of the "B" pit, which is located in the agricultural district of Abbotsford. Upon completion of the reclamation program, the agricultural capability of the land was greatly improved from being used primarily for forage to being capable of producing an extensive range of crops.
- Exploration reclamation — was awarded to Doublestar Resources, for their proactive and responsible approach to reclamation at the Yellow Giant property located on Banks Island south of Prince Rupert.

Technical and Research Committee on Reclamation

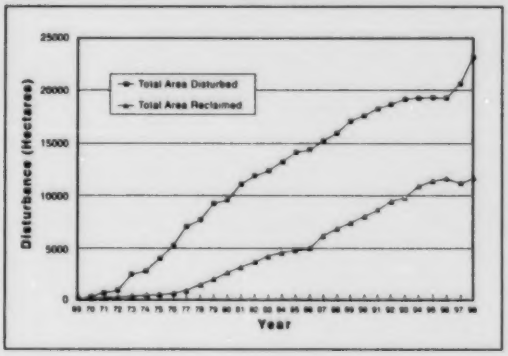
This committee has been active in promoting and fostering reclamation research and information exchange for more than two decades. Members are drawn from the Ministry of Energy and Mines, Ministry of Environment, Lands and Parks, mining companies, the Mining Association of B.C., the University of Northern B.C., the University of B.C., Camosun College, and the Coal Association of Canada. This committee has been responsible for the organization of the annual B.C. Mine Reclamation Symposium for the past 22 years.

INDUSTRY RECLAMATION RECORD

The mining industry in B.C. currently consists of large-scale open-pit metal mines, open-pit coal mines, underground metal mines and one underground coal mine. Much of the surface disturbance is associated with open-pit mines developed since the late 1960s.

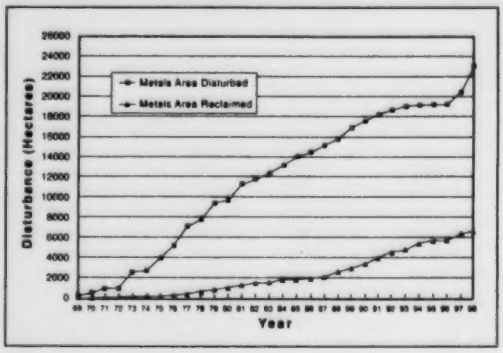
The following three graphs show the separate breakdown of disturbed and reclaimed land at coal and metal mines to Dec. 31, 1998.

Land Disturbed and Reclaimed by Metal & Coal Mines, 1969 - 1998



Total area disturbed by coal and metal mines, to the end of 1998 was 39,205 hectares. Total area reclaimed was 11,572 hectares (29.5 per cent).

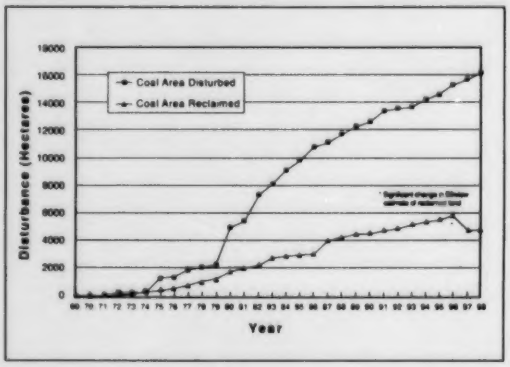
Land Disturbed and Reclaimed by Metal Mines, 1969 - 1998



The sharp increase in disturbance at metal mines during 1997-98 reflects the construction and development of three new mines – Huckleberry, Mt. Polley and Kemess South.

Total area disturbed by metal mines, to the end of 1998 was 23,095 hectares. Total area reclaimed was 6813 hectares (29.5 per cent).

Land Disturbed and Reclaimed by Coal Mines, 1969 - 1998



Permitting

During 1998 permitting activity remained high. Four new permits were issued and 28 amendments to existing permits were made.

Summary of permit activity for 1998

	Permits	Amendments	Total
Metal	1	16	17
Coal	1	10	11
Quarry	2	1	3
Sand Gravel	0	1	1
Total	4	28	32

4.2 Geotechnical/Mining Roads

Roles and Responsibilities

The geotechnical section reviews mine designs for the project review stage of the *Environmental Assessment Act* process, as well as the application of the *Mines Act* under section 10. Other duties include the inspection of major geotechnical works at mines, the assessment of geotechnical performance for worker protection and public health and safety, and for protection of land and watercourses.

The section provides in-house technical expertise and policy advice for:

- open cut and underground rock mechanics;
- large soil structures such as mined rock and overburden dumps and tailings impoundments; roads, including route selection, standards and construction; and,
- risk evaluation for worker protection and public health and safety, and environmental impact of geotechnical projects.

Organization

The section consists of a manager, a senior engineer and an administrative assistant.

Summary of Activities
Compliance and Work Systems

In 1998, the geotechnical section:

- conducted a total of 68 inspections at metal, coal and other mine locations;
- issued a total of 28 *Mines Act* permits or permit amendments to metal, coal and other mine operations approving major geotechnical structures;
- participated in project reviews for Kemess South, Mt. Polley, Golden Bear, Tulsequah, Quintette, Huckleberry, Quinsam, Snip, Eskay, Fording River, Jack Cewe, and Myra Falls; and,
- provided advice and design requirements on numerous other smaller project referrals or requests.

Liaison, committees and special assignments

The major activities for this section involved liaising with colleagues in regional offices, other branches, other ministries, the general public, consultants, mining company engineers and employees about work systems, compliance, incidents, guidelines and research.

Mining Roads

The proposed Bronson Slopes, Isk Wollastonite and Tulsequah mine access roads were high-priority areas. The section was active in answering queries about old mining roads, supplying information to government ministries and the general public.